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Dr. Crowley

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Eighth SIAM Conference on Applications of Dynamical Systems (22-26 May 2005 in Snowbird/Utah)

The Snowbird 2005 conference was the eighth of a series of highly successful meetings organized by SIAM through its Activity Group on Dynamical Systems. The biannual Snowbird conference is arguably one of the broadest and most important meetings for mathematicians, engineers and scientists interested in nonlinear dynamics and its interdisciplinary applications.

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Final Technical Report (DS05)

Eighth SIAM Conference on Applications of Dynamical Systems (22-26 May 2005 in Snowbird/Utah)

The Snowbird 2005 conference was the eighth of a series of highly successful meetings organized by SIAM through its Activity Group on Dynamical Systems. The biannual Snowbird conference is arguably one of the broadest and most important meetings for mathematicians, engineers and scientists interested in nonlinear dynamics and its interdisciplinary applications.

This year's meeting continued in this tradition. Noteworthy aspects of the 2005 meeting are the first DSWeb graduate student competition for dynamical systems tutorials and the increased number of industry related mini-symposia (seven mini-symposia had organizers from industry). Compared with the 2003 meeting, the number of mini-symposium submissions increased by 15%, making it necessary for the first time in the history of these meetings to combine or reject sessions due to space and time limitations.

Snowbird 2005 drew 640 participants coming from 28 countries. About 594 of the attendees came from academia, 27 from Government, 15 from industry and 4 indicated none of these categories. The program consisted of 10 plenary presentations, 108 mini-symposia comprising 544 speakers, 55 contributed sessions with 152 talks, and a poster session with 46 posters. Fifteen mini-symposia involved organizers from industry, non-profit organizations, and various US and non-US government agencies or laboratories. At a ceremony on the first evening of the conference, the SIAM Activity Group awarded both the Jürgen Moser Lecture Prize and the JD Crawford Prize. Later a second ceremony was held to announce the winners of the DSWeb Contest for dynamical systems tutorials and the "Red Sock Award" for the best posters.

Some of the plenary talks covered topics in core dynamical systems areas ranging from theoretical results in ergodic theory, Hamiltonian maps and dispersive PDEs to new phenomena in pattern-forming systems. Others addressed interdisciplinary projects in turbulence, molecular dynamics and robotic locomotion to real-life problems applications to electric power blackouts and call-center management. This diversity reflected the broad research interests of the Snowbird community, which were very visible in the topics represented in the mini-symposia and contributed sessions. The overwhelming part of talks focused on how dynamical systems can be used in interdisciplinary research and how conversely applications generate new mathematical ideas and techniques.

Among the specific applications in industrial mathematics were the control and design of satellites, modeling issues in the biotech industry, and the dynamics of structures ranging from microwave devices to ships. Mathematical biology was again strongly represented with many sessions on neuroscience, synchrony, cardiac arrhythmias, angiogenesis, infectious decease spreading, swarming and slime molds, to name but a few. This year the number of minisymposia covering stochastic processes saw a sharp increase, with applications in oceanography, biology, networks, and even one session discussing probabilistic models in sports. There was a good balance between sessions in more "traditional" application areas such fluid dynamics and nonlinear optics, and newer emerging topics such as the equation-free coarse-grained simulation of multiscale problems and topological methods to classify patterns in Rayleigh-Benard convection and other systems. Theoretical core areas were represented as well with topics ranging from normal forms, Lyapunov exponents, nontwist Hamiltonian systems to hyperbolic dynamics. The contributed sessions were of very high quality and very well attended.

The 2005 Jürgen Moser Lecture Prize was awarded to

Stephen Smale (Toyota Technological Institute at Chicago).

The Moser Lecture Prize was inaugurated in 2001 to honor the memory of Jürgen Moser, one of the world's leading mathematicians in celestial mechanics and dynamical systems. It is awarded to a person who has made distinguished contributions to nonlinear science (including dynamical systems theory and its applications, experiments and computations/simulations).

The recipient of the 2005 JD Crawford Prize is

Dwight Barkley (University of Warwick).

The JD Crawford Prize, inaugurated also in 2001, is awarded to one individual for recent outstanding work on a topic in nonlinear science, as evidenced by a publication in English in a peer-reviewed journal within the four calendar years preceding the SIAG/DS meeting at which the prize is awarded. The prize is dedicated to the memory of John David Crawford, a former co-chair of this conference.

The evening poster session, with desert and coffee, has continued to be a very well attended, successful event. Jim Yorke, together with Robert Ghrist, Mark Levi, Paul Milewski, Wim van Saarloos and William Troy who served as judges, awarded four "Red Sock Awards" for the most outstanding posters. The recipients of a (new) pair of red socks and a cash prize of $100 each were

- Margaret Beck (Boston University)
- Maria Leite (University of Houston)
- Maria Carmen Romano and Marco Thiel (University of Potsdam)
- Yulia Timofeeva (Heriot-Watt University)

This year, DSWeb, the website of the SIAM Activity Group on Dynamical Systems, ran for the first time a graduate student competition for tutorials on dynamical systems. Evelyn Sander (DSWeb Tutorials Editor) announced the winners of this contest:

1. Sam Reid (University of Colorado at Boulder)
2. David M. Winterbottom (University of Nottingham)
3. Shawn C. Shadden (California Institute of Technology)

Runner-up: Brian Bockelman (University of Nebraska at Lincoln)

Honorable mentions: Sebastian M. Marotta (Boston University)
Gouhei Tanaka (University of Tokyo)

The plenary talks represented a broad cross-section of recent mathematical results in dynamical systems theory as well as engineering and scientific applications of nonlinear dynamics. The ten speakers and their topics were:

- Rafael de la Llave, University of Texas, Austin
  Invariant Manifolds: Theorems, Algorithms and Conjectures
- Ian Dobson, University of Wisconsin, Madison
  Cascading Failure and Complex Dynamics in Large Blackouts
- Charles Doering, University of Michigan
  Turbulent Transport, Dissipation and Drag
- William A. Massey, Princeton University
  A Dynamical Systems Analysis for Stochastic Models of Call Centers
- Yasumasa Nishiura, Hokkaido University, Japan
  Dynamics of Particle Patterns in Dissipative Systems
- Andy Ruina, Cornell University
  The Existence and Stability of Limit Cycles as a Means to Understanding Animal- and Designing Robotic Locomotion
- Christof Schütte, Free University of Berlin, Germany
  Metastability in Complex Systems
- Gigliola Staffilani, Massachusetts Institute of Technology
  Recent Results on Local and Global Well-Posedness for some Dispersive Equations
- Shankar Venkataramani, University of Arizona
  Non-convex Variational Problems: Multiple-scale Behaviors in Equilibrium
- Amie Wilkinson, Northwestern University
  Stable Ergodicity: A Little Hyperbolicity is Often Enough

The Jürgen Moser Lecture was given by

Stephen Smale (Toyota Technological Institute at Chicago)
Dynamics and Learning.

The 108 mini-symposia were:

- *Pattern Formation in Surface Catalysis: Stochastic Effects and Inhomogeneous Materials*
  Hannes Uecker, University of Karlsruhe, Germany
  Jens Starke, University of Heidelberg, Germany
- *Multiscale Approaches to Transport Modeling and Computation* - Parts I and II
  Peter R. Kramer, Rensselaer Polytechnic Institute
- *Topological Analysis of Patterns - Parts I and II*
  Thomas Wanner, George Mason University
  Konstantin Mischaikow, Georgia Institute of Technology
- *Geometric Hamiltonian PDEs and Ferromagnetism*
  Chongchun Zeng, University of Virginia
- *Models of Biological Aggregations*
  Chad M. Topaz, University of California, Los Angeles
  Anke Ordemann, Philipps-Universität, Marburg, Germany
- *Dynamics of Central Pattern Generators*
  Amitabha K. Bose, New Jersey Institute of Technology
- *Mixing in 3-D Volume-Preserving Systems and Maps* – Parts I and II
  Dmitri L. Vainchtein, University of California, Santa Barbara
  Oreste Piro, Universidad de las Islas Baleares, Spain
- *Dynamical Systems and Industry: Dynamic Interactions* - Parts I and II
  Andrzej Banaszuk, United Technologies Research Center
  Michael Dellnitz, University of Paderborn, Germany
- *Applied Symbolic Dynamics*
  Ned J. Corron, US Army RDECOM
  Shawn Pethel, US Army RDECOM
- *Distributed Motion Coordination* - Parts I and II
  Jorge Cortes, University of California, Santa Cruz
  Francesco Bullo, University of California, Santa Barbara
- *Pattern Formation Under Control* - Parts I and II
  Alexander A. Golovin, Northwestern University
  Alexander Nepomnyashchy, Technion - Israel Institute of Technology, Israel
- *Stable Patterns in Evolution Equations*
  Michael Grinfeld, University of Strathclyde, United Kingdom
  Gabriel J. Lord, Heriot-Watt University, United Kingdom
- *Topology and Nonlinear Dynamics*
  Marc Lefranc, PhLAM/Université Lille I, France
  Robert Gilmore, Drexel University
- *Dynamics of Localized Patterns in Reaction-Diffusion Systems*
  Jens Rademacher, University of British Columbia, Canada
  Michael Ward, University of British Columbia, Canada
- *Instabilities and Complexity in the Heart: Models, Experiments, and Simulations* - Parts I and II
  Elizabeth M. Cherry, Hofstra University
  Flavio Fenton, Beth Israel Medical Center & Hofstra University
- *Stochastic Dynamics in Biology* - Parts I and II
  Paul Atzberger, Rensselaer Polytechnic Institute
  Peter R. Kramer, Rensselaer Polytechnic Institute
- *Robust Flow Stability and Control*
  Kumar M. Bobba, University of Massachusetts
  John Doyle, California Institute of Technology
- *Pattern Formation and Wave Dynamics in the Brain*
  Steven J. Schiff, George Mason University
  Ernest Barreto, George Mason University
- *Chaos for Radar and Sonar*
  Thomas Carroll, US Naval Research Laboratory
  Alan Fenwick, QinetiQ, United Kingdom

- *Delay Effects in Applications*
  Jan Sieber, University of Bristol
  Bernd Krauskopf, University of Bristol, United Kingdom
  Jacques Belair, Universite de Montreal, Canada
- *Synchronization of Complex Networks*
  Stefano Boccaletti, Istituto Nazionale di Ottica Applicata, Italy
  Louis M. Pecora, Naval Research Laboratory
- *On the Validity of Envelope Equations*
  Joceline Lega, University of Arizona
  Nicholas Ercolani, University of Arizona
- *Nontwist Hamiltonian Systems: Theory and Applications* - Parts I and II
  Alexander Wurm, University of Texas at Austin
  Philip J. Morrison, University of Texas at Austin
- *Cellular Waves and Rhythms in True Slime Mold: Experiments and Dynamics*
  Toshiyuki Nakagaki, Hokkaido University, Japan
- *Propagation in Neural Fields* - Parts I and II
  Jonathan E. Rubin, University of Pittsburgh
  Stephen Coombes, University of Nottingham, United Kingdom
- *Nonautonomous Dynamical Systems* - Parts I and II
  Jinqiao Duan, Illinois Institute of Technology
  Stefan Siegmund, University of Frankfurt, Germany
- *Scaling and Self-Similarity in Dynamical Systems*
  Shankar C. Venkataramani, University of Arizona
  Govind Menon, Brown University
- *The Canard Phenomenon: Mechanisms in Chemical, Biochemical and Biological Systems* - Parts I and II
  Horacio Rotstein, Boston University
  Martin Wechselberger, Ohio State University
- *Control of Hamiltonian Systems*
  Igor Mezic, University of California, Santa Barbara
  James D. Meiss, University of Colorado, Boulder
- *Waves and Turbulence in Stratified Flows*
  Paul A. Milewski, University of Wisconsin
  David J. Muraki, Simon Fraser University, Canada
- *Lattice Solitons in Discrete Equations* - Parts I and II
  Dmitry Pelinovsky, McMaster University, Canada
  Alan Champneys, University of Bristol, United Kingdom
- *Spatio-Temporal Dissipative Structures Induced by Non-Local Interactions*
  Mustapha Tlidi, Université Libre de Bruxelles, Belgium
  Axel Hutt, Humboldt University at Berlin, Germany
- *Dynamics of Chaotic RF/Microwave Devices*
  Jonathan N. Blakely, US Army RDECOM
- *Hyperbolic Dynamical Systems*
  Matthew Nicol, University of Houston
  Andrew Torok, University of Houston
- *Synchrony in Neuroscience*
  Stefano Boccaletti, Istituto Nazionale di Ottica Applicata, Italy
  Kresimir Josic, University of Houston
  Mario Chavez, Istituto Nazionale di Ottica Applicata, Italy
- *New Twists on Solitary Wave in Excitable Media*
  Alan Champneys, University of Bristol, United Kingdom
  Vivien Kirk, University of Auckland, New Zealand
  Edgar Knobloch, University of California, Berkeley
- *Equation-free Coarse-grained Simulation and Applications* - Parts I and II
  Peter J. Mucha, Georgia Institute of Technology
  Giovanni Samaey, Katholieke Universiteit Leuven, Belgium

- *Parabolic Equations, Topology and the Conley Index*
  Jan Bouwe Van Den Berg, VU University, Amsterdam
  Robert Vandervorst, VU University, Amsterdam
- *Adaptation in Biological Systems From a Dynamical System's Perspective*
  Ulrike Feudel, University of Oldenburg, Germany
  Thilo Gross, Universität Potsdam, Germany
- *Recent Progress in Wave Turbulence*
  Yuri V. Lvov, Rensselaer Polytechnic Institute
- *Diffusive Mixing in Fluid Flows: Theory and Applications* - Parts I and II
  Arjendu K. Pattanayak, Carleton College
  George Haller, Massachusetts Institute of Technology
- Rec*ent Applications of Dynamics Systems in Industrial Settings*
  Richard Braun, University of Delaware
- *Coupled Cell Systems, Synchrony and Patterns* - Parts I and II
  Andrew Torok, University of Houston
  LieJune Shiau, University of Houston, Clear Lake
- *Mathematical Methods for Spatiotemporal Infectious Disease Spread*
  Richard Jordan, Dynamics Technology, Inc.
- *Lyapunov Exponents and Stability Spectrum for Infinite Dimensional Dynamical Systems*
  Erik Van Vleck, University of Kansas
  Mike Jolly, Indiana University
- *Geometric Dynamics and its Applications* - Parts I and II
  Melvin Leok, University of Michigan, Ann Arbor
  Dmitry V. Zenkov, North Carolina State University
  Anthony M. Bloch, University of Michigan
- *Cell Oriented Biological Models of Development*
  James A. Glazier, Indiana University
  Roeland Merks, Indiana University
- *Mean Flows in Dynamical Systems*
  Yuan-Nan Young, New Jersey Institute of Technology
  Maria Higuera, Universidad Politécnica de Madrid, Spain
- *Reduced Neuronal Models and Complex Neurodynamics*
  Maxim Bazhenov, Salk Institute
  Nikolai Rulkov, University of California, San Diego
- *Nondestructive System Health Monitoring*
  Mary Ann F. Harrison, Institute for Scientific Research, Inc.
- *Random Dynamical Systems and Stochastic Resonance*
  Ying-Cheng Lai, Arizona State University
- *Synchronization in Complex Neural Systems*
  John R. Terry, Loughborough University, United Kingdom
  Juergen Kurths, Universität Potsdam, Germany
- *Propagation By Reaction and Diffusion: Theory and Applications* - Parts I and II
  Georgi S. Medvedev, Drexel University
  Cyrill B. Muratov, New Jersey Institute of Technology
- *Rigorous Computational Dynamics* - Parts I and II
  Sarah Day, Cornell University
  Oliver Junge, University of Paderborn, Germany
  William D. Kalies, Florida Atlantic University
- *Modeling and Simulation of Angiogenesis*
  Scott Kelly, University of Illinois, Urbana-Champaign
  Marialuisa Ruiz, Entelos Incorporated
- *Stochastic Modeling of Oceanic Transport*
  Peter R. Kramer, Rensselaer Polytechnic Institute
  Emilio Castronovo, Rensselaer Polytechnic Institute
- *Complex Dynamics of Systems with Multiple Time Scales*
  Andrey Shilnikov, Georgia State University

Arkady Pikovsky, University of Potsdam, Germany

- *Extreme Ship Dynamics* - Parts I and II
  Leigh Mccue, Virginia Tech
  Armin Troesch, Naval Architecture and Marine Engineering at the University of Michigan
- *Normal Forms and Averaging in ODEs and PDEs*
  James A. Murdock, Iowa State University
- *Geometric Blow-up and Stability of Nonlinear Waves*
  Mariana Haragus, Universite de Franche-Comte, France
  Arnd Scheel, University of Minnesota, Minneapolis
- *Extended Stochastic Dynamical Systems*
  Jonathan C. Mattingly, Duke University
  Luc Rey Bellet, University of Massachusetts
- *Transient Chaos and Applications*
  Ying-Cheng Lai, Arizona State University
  Tamas Tel, Eötvös Loránd University, Hungary
- *Dynamics and Control of Fishlike Locomotion*
  Scott Kelly, University of Illinois, Urbana-Champaign
  Clancy W. Rowley, Princeton University
- *Issues in Cancer Therapy Modelling*
  Michael Grinfeld, University of Strathclyde, United Kingdom
  Eliezer Shochat, Weizmann Institute of Science, Israel
- *Chaotic Advection and Anomalous Diffusion in Reactive Flows*
  Diego Del-Castillo-Negrete, Oak Ridge National Laboratory
  Tom Solomon, Bucknell University
- *Modeling and Simulation of Photonic Bandgap Structures*
  Roy H. Goodman, New Jersey Institute of Technology
- *Waves and Coherent Structures in Neural Systems* - Parts I and II
  Louis Tao, New Jersey Institute of Technology
  Tim Lewis, University of California, Davis
- *Modeling in the Biotech Industry*
  Eric N. Cytrynbaum, University of British Columbia, Canada
- *Theory and Numerical Analysis of Bifurcations in Piecewise Smooth Dynamical Systems*
  Piotr Kowalczyk, University of Bristol, United Kingdom
  Petri T. Piiroinen, University of Bristol, United Kingdom
- Synchronization *in Oscillator Arrays and Nonlinear Signal Processing*
  Michael L. Larsen, Information Systems Labs
  Michael Gabbay, Information Systems Labs
- *Patterns and Dynamics of Turbulence*
  Dwight Barkley, University of Warwick, United Kingdom
  Laurette S. Tuckerman, LIMSI-CNRS, France
- *Nonlinear Dynamics of Microelectromechanical Systems*
  Jeff Moehlis, University of California, Santa Barbara
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  Steven Shaw, Michigan State University
- *Nonlinear Methods in Ecology and Population Dynamics*
  Linda J. Moniz, U. S. Geological Survey
  James Nichols, U. S. Geological Survey
- *Discrete and Continuous Models in Nonlinear Optics*
  Milena Stanislavova, University of Kansas, Lawrence
  Jamison Moeser, University of Colorado
- *Numerical Methods for Dynamical Systems with Multiple Timescales*
  Hinke M. Osinga, University of Bristol, United Kingdom
- *Randomly Influenced Dynamical Systems* - Parts I and II
  Kening Lu, Brigham Young University
  Bjorn Schmalfuss, University of Paderborn, Germany
- *Seizure Dynamics*

Steven J. Schiff, George Mason University

- *Patterns in Extended Systems*
  Ziad Musslimani, University of Central Florida
  Roy Choudhury, University of Central Florida
- *Stochastic Modeling and Statistical Description of Spatially Extended Nonlinear Systems*
  Ilya Timofeyev, University of Houston
  Daan Crommelin, Courant Institute, New York University
- *Emergence and Breakup of Tori*
  Ferdinand Verhulst, University of Utrecht, Netherlands
  Alois Steindl, Vienna University of Technology, Germany
- *Dynamics and Control of Microelectromechanical Devices*
  John A. Pelesko, University of Delaware
  Eihab Abdel-Rahman, Virginia Institute of Technology
- *Dynamics and Control of Fluid Flows*
  Troy R. Smith, California Institute of Technology
- *Probabilistic Models for Sports*
  Paul K. Newton, University of Southern California
  Peter J. Mucha, Georgia Institute of Technology
- *Transverse effects in Liquid Crystal Light Valve with optical feedback*
  Majid Taki, PHLAM - Universite de Lille, France
  Mustapha Tlidi, Université Libre de Bruxelles, Belgium
- *Non-Hyperbolic Problems in Singular Perturbation Theory*
  Weishi Liu, University of Kansas
  Martin Krupa, New Mexico State University
- *High-dimensional Chaos Versus Synchronization: Applications to Neurophysiology and Physics*
  Peter A. Tass, Research Centre Juelich, Germany
  Yuri L. Maistrenko, Institute of Mathematics, Kiev, Ukraine
  Arkady Pikovsky, University of Potsdam, Germany

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Respectfully submitted,

Rachel Kuske and Björn Sandstede
Co-Chairs, DS05